Geotechnical Engineering Report

Drake Street Development
Columbia, SC
October 27, 2022
Terracon Project No. 73225121

Prepared for:
Terra Alta Ventures, LLC
Salt Lake City, Utah

Prepared by:
Terracon Consultants, Inc.
Columbia, SC

October 27, 2022

Terra Alta Ventures, LLC
1775 E 4500th S
Salt Lake City, Utah 84117

Attn: Mr. David Madsen
P: 801-916-6366
E: david@thorntonwalker.com

Re: Geotechnical Engineering Report
Drake Street Development
Columbia, SC
Terracon Project No. 73225121

Dear Mr. Madsen:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P73225121 dated and authorized on September 7, 2022. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Loren Martin

Loren W. Martin, E.I.T.
Geotechnical Staff Engineer

Phillip A. Morrison, P.E.
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SOUTH CAROLINA PROFESSIONAL ENGINEER REGISTERED No. 17275 PHILLIP A. MORRISON

SOUTH CAROLINA TERRACON CONSULTANTS, INC. No. 2220 CERTIFICATE OF AUTHORIZATION

REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report

Drake Street Development
1002 Drake Street
Columbia, SC
Terracon Project No. 73225121
October 27, 2022

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Drake Street Development to be located at 1002 Drake Street in Columbia, SC. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Lateral earth pressures
- Excavation considerations
- Foundation design and construction
- Floor slab design and construction
- Seismic site classification per IBC
- Pavement design and construction

The geotechnical engineering scope of services for this project included the advancement of thirteen test borings to depths ranging from approximately 10 to 15 feet below existing ground surface (bgs) and geophysical testing to develop the shear wave velocity profile. **Site Location** and **Exploration Plan** present the site and boring locations, respectively. The boring logs and the results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included in **Exploration Results**.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The 6.9±-acre project site is located on the west side of Drake Street beginning at its Norris Street intersection and extending south to about 300 feet south of Clifton Street in Columbia, SC. The approximate center of the site is located at 33.983063° N, 80.957171° W. For additional Location information, See **Site Location**.

Item	Description
Existing Improvements	The site was formerly a construction office in the southern two-thirds of the property. The northern one third is a commercial development. From our recent and past environmental work at the site, we are aware of past contamination. We understand that contaminants are pesticides and dioxins. There are several, small- to moderate-sized buildings distributed across the site, associated with its former use. The site is no longer used for this purpose and the area has reforested.
Current Ground Cover	Much of the area is forested with moderate pines and underbrush. The area around the northmost building is open and grassed.
Existing Topography	Based on the information available from the provided topographic plan, the site topography slopes downward to the north/northwest. Elevations range from 150 feet at the southeast corner to 140 feet at the northwest corner.
Geology	Coastal Plain The site is located in the upper Coastal Plain physiographic province of South Carolina. The Coastal Plain is a wedge-shaped cross-section of water and wind deposited soil. Its thickness ranges from a featheredge at the surface contact of the Piedmont (Fall Line) to several thousand feet at the present-day coastline. The sediments range in age from the Cretaceous and Tertiary periods at the contact with the bedrock to the recent period at the present coastline. The sediments include clays, silts, sands, and gravels, as well as organics. Fill soils are those soils that have been placed or reworked in conjunction with past construction grading or farming. Fill can be composed of different soil types from various sources and can contain debris from building demolition, organics, topsoil, trash, etc. The engineering properties of the fill depend primarily on its composition, density, and moisture content.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	"Site Plan 1" dated 9/13/ 2022, received on 10/11/ 2022 "Grading and Site Plan" dated 9/29/2022, received on 10/11/ 2022 "Drake St. – Topo – Updated" dated 8/31/2022, received on 10/11/ 2022

Item	Description
Project Description	The project will include a 150-unit apartment complex consisting of a 3-story and eight, 2-story apartment buildings with surface parking in the common space.
Proposed Structures	The 3-story apartment building will have a footprint of approximately 29,250 sf. Four of the 2-story apartment buildings will have a footprint of 6,750 sf while the remaining 4 will have a footprint of 4,500 sf.
Building Construction	Each of the buildings is expected to be wood-framed with a concrete slab-on-grade.
Finished Floor Elevation	The Grading and Site plan indicates the Finish Floor Elevations (FFE) will range between 142± and 148± feet. These are near the existing ground elevations.
Maximum Loads	Structural loads have not been developed at this time. We have assumed the following: ■ Three-story building: o Columns: 75 kips o Walls: 3 kips per linear foot (klf) ■ Three-story building: o Columns: 60 kips o Walls: 2 kips per linear foot (klf) The floor slabs in each building is expected to be exposed to no more than 120 pounds per square foot (psf)
Grading/Slopes	The grading indicates the majority of the site will have minimal cuts and fills of approximately 2 feet or less. A stormwater detention pond is planned at the northern corner of the site. It will have an invert elevation of 140± feet. The side slopes will have a crest elevation of 144± feet and an inclination of no steeper than 3H:1V.
Below-Grade Structures	A swimming pool is planned for the common area of the development. We anticipate its depth will be less than 8 feet.
Free-Standing Retaining Walls	None indicated.
Pavements	Paved driveways and parking areas for approximately 276 vehicles will be constructed. Flexible (asphalt) pavement will be the primary pavement type. A dumpster area will be included in the southeast portion of the development. The provided plans indicate an enclosure with a concrete pad
Estimated Start of Construction	Summer of 2023

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in **Exploration Results** and the GeoModel can be found in **Figures**.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Fill**	Silty Sand with Gravel, fine to coarse grained, subangular, dry to moist, loose to medium dense
2	**Silty Sand**	Fine to coarse grained, subangular, dry to moist, loose to medium dense
3	**Clayey Sand**	Fine to medium grained, subangular, moist, loose to medium dense
4	**Lean Clay**	Moist, very stiff

Groundwater was encountered in Boring B-12 at a depth of 30 feet at the time of field exploration. The remainder of the borings, advanced to depths of 15 feet or less, were dry at the time of the field exploration.

These observations represent groundwater conditions at the time of the field exploration, and may not be indicative of other times, or at other locations. Groundwater levels can be expected to fluctuate with varying seasonal and weather conditions.

GEOTECHNICAL OVERVIEW

The boring data indicates soil conditions that are generally compatible with the proposed development plan. The site soil types are generally loose to medium dense silty sands and clayey sands. The buildings can be supported by conventional spread/strip footings with tolerable settlement estimates. **Shallow Foundations** addresses support of the structure bearing on firm native soil or engineered fill.

The primary geotechnical consideration is due to its current and previous development as well as its vegetation. The site contains or has contained various structures and underground utilities. Razing of the existing structures and removal of the associated foundations and underground utilities will likely disturb the surficial soil conditions at least on an isolated basis. Removal of the tree stumps and root system will have a similar effect. This will require reworking of the subgrade to prepare it for fill placement and support of pavements, foundations, and floor slabs for the planned development.

The boring data indicates the presence of existing fill. Borings B-6, B-8, B-9 and B-10 encountered existing fill to approximately 3 to 5 – ½ feet bgs. There is an inherent risk associated with constructing structures on existing fill. These include the potential for excessive post-construction settlement that could result in distress of the slabs and structures. Even with the recommended construction testing services, there is a risk for the owner that compressible fill or unsuitable material within or buried by the fill will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by performing additional testing and evaluation. **Existing Fill** addresses the activities recommended should existing fill be exposed.

At the time of this report, a Media Management Plan has not been developed. We understand that the site is being enrolled in the SCDHEC Voluntary Cleanup Program for assessment and potential environmental remedy. The results of that assessment will likely necessitate preparation of a Media Management Plan and/or a Corrective Measures Plan. These plans will account for environmental impacts (if any) relative to redevelopment considerations. We recommend that the Client reconcile the geotechnical recommendations presented this report with any future environmental reports and plans, when they become available. Special coordination of trades (installation of utilities and other underground items) would be needed as they must be installed prior to and deeper than the stabilization. Further, the inclusion of a specialty contractor on the construction team would be necessary. Other limitations on site preparation may also be required by SCDHEC.

Depending on the direction of the Media Management Plan, some materials may require special handling and disposal. We recommend that the construction budget and schedule include contingencies for preparation/removal and disposal of the on-site materials.

From a geotechnical viewpoint, the on-site excavated soils should be satisfactory for use as structural fill provided the site preparation recommendations described in the **Earthwork** are followed and the requirements of the Media Management Plan are followed.

Groundwater was encountered at a depth of 30 feet the during our field exploration. Therefore, it is not expected to adversely impact the planned construction activities.

Both portland cement and asphalt pavement systems are expected to be used at this site. **Pavements** present a recommended pavement section for each.

The recommendations contained in this report are based upon the results of data presented herein, engineering analyses, and our current understanding of the proposed project. **General Comments** provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include clearing and grubbing, excavations, fill placement and razing of existing structures. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Site Preparation

Site preparation should begin with the demolition of the existing structure/pavements and debris removal. As part of the demolition, buried utilities and/or concrete foundations should also be removed. Existing utilities that are to be abandoned should be removed or filled with grout. The excavations resulting from foundation and utility removal should be properly backfilled with compacted structural fill as described in the following subsections. Utilities that are to remain in service should be accurately located horizontally and vertically to minimize conflict with new foundation construction and their backfill evaluated and repaired as necessary.

Any remaining construction debris, existing vegetation, topsoil, and any otherwise unsuitable material should be removed from the construction areas prior to placing fill. Stripped materials consisting of vegetation and organic materials should be wasted off site in accordance with the SMP (when available) or stockpiled to vegetate landscaped areas or exposed slopes after completion of grading operations.

After the site has been cleared and grubbed and the existing structures have been razed, the exposed subgrade soils should be proofrolled to detect soft or loose soils and identify unsuitable or poorly compacted fill. Proofrolling should be performed with a fully loaded, tandem-axle dump truck or similar pneumatic-tired construction equipment. This is especially important at this site, given the presence of existing fill is expected to be present near the locations of the existing buildings. Terracon representative should observe this operation to aid in delineating unstable soil areas. Proofrolling should be performed after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade. Soils which continue to rut or deflect excessively under the proofrolling operations should be undercut to soils that would provide a firm base for the compaction of the structural fill. The undercut soils should be replaced with compacted structural fill, placed as described in "Fill Compaction Requirements". After completion of all placement/compaction of the structural fill, the final subgrades should be proofrolled prior to further construction.

Existing Fill

As noted in **Geotechnical Characterization**, existing fill is present on the site, we have no records to indicate the degree of control. Support of footings, floor slabs, and pavements, on or above existing fill soils, is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill will, not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report.

If the owner elects to construct the footings and floor slabs on the existing fill, the following protocol should be followed. Once the planned grading has been completed, the entire area should be proof rolled with heavy, rubber-tired construction equipment, to aid in delineating areas of soft, or otherwise unsuitable soil. The bottom of footings should be checked with hand augers and Dynamic Cone Penetrometer (DCP) testing. Any unstable or yielding areas should be evaluated by the Geotechnical Engineer and repair as recommended. Based on the soil conditions, we anticipate the remedial work would include undercutting and replacement with compacted structural fill. If moisture conditioned, we anticipate the existing soils (less organics and debris) can be reused as structural fill. For the proposed pavements, the same protocol should be followed.

If the owner elects to construct pavements on the existing fill, the following protocol should be followed. Once the planned subgrade elevation has been reached the entire pavement area should be proofrolled. Areas of soft or otherwise unsuitable material should be undercut and replaced with either new structural fill or suitable, existing on-site materials.

Fill Material Types

Earthen materials used for structural and general fill should meet the following material property requirements:

Soil Type [1]	USCS Classification	Acceptable Location for Placement
Imported Soils	SM and SC	All locations and elevations
On-site Soils	SM, SC, and SP-SM	All locations and elevations [2]

1. Structural should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
2. Subject to change based on the results of the environmental evaluation and the Media Management and Corrective Measures Plans.

Fill Compaction Requirements

Structural fill should meet the following compaction requirements.

Item	Structural Fill
Maximum Lift Thickness	8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used
Minimum Compaction Requirements [1, 2]	95% of the material's standard Proctor maximum dry unit weight (ASTM D 698)
Water Content Range [1]	-2% to +2% of optimum

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. We recommend that engineered fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.

Grading and Drainage

All grades must provide effective drainage away from the buildings during and after construction and should be maintained throughout the life of the structures. The roof should have gutters/drains with downspouts that discharge directly into the storm drain system.

Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

Groundwater was encountered at a depth of 30 feet during our site exploration. Therefore, groundwater is not expected to negatively affect the earthwork and utility installation.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of areas delineated by the proofroll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. One density and water content test should be performed for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads

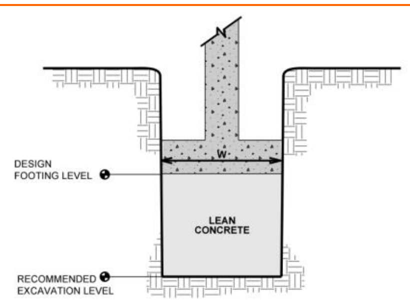
Item	Description
Maximum Net Allowable Bearing pressure [1, 2]	3,000 psf
Required Bearing Stratum [3]	Medium dense native soils or compacted structural fill.
Minimum Foundation Dimensions	Columns: 30 inches Continuous: 18 inches
Ultimate Passive Resistance [4] **(equivalent fluid pressure)**	345 pcf
Ultimate Coefficient of Sliding Friction [5]	0.35 (granular material)
Minimum Embedment below Finished Grade [6]	12 inches
Estimated Total Settlement from Structural Loads [2]	Less than about 1 inch
Estimated Differential Settlement [2, 7]	About ½ inch

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in **Project Description**.
3. Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in the **Earthwork**.
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
6. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
7. Differential settlements are as measured over a span of 50 feet.

Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the direction of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

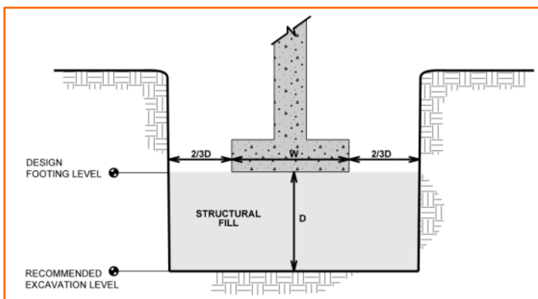
If unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. This is illustrated on the sketch below.



LEAN CONCRETE BACKFILL

NOTE: EXCAVATIONS ARE SHOWN VERTICAL; HOWEVER, THE SIDEWALLS SHOULD BE SLOPED AS NECESSARY FOR SAFETY

Over-excavation for structural fill placement below footings should be conducted as shown below. The over-excavation should be backfilled up to the footing base elevation, with structural fill placed, as recommended in **Earthwork**.



OVER-EXCAVATION / BACKFILL ZONE

NOTE: EXCAVATIONS ARE SHOWN VERTICAL; HOWEVER, THE SIDEWALLS SHOULD BE SLOPED AS NECESSARY FOR SAFETY

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties encountered at the site and as described on the exploration logs and the results of the geophysical testing, it is our professional opinion that the **Seismic Site Classification is C**.

FLOOR SLABS

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support [1]	Minimum 12 inches of approved on-site or imported soils placed and compacted in accordance with **Earthwork**.
Estimated Modulus of Subgrade Reaction [2]	100 pounds per square inch per inch (psi/in) for point loads

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads, the modulus of subgrade reaction would be lower.
3. Free-draining granular material should have less than 5% fines (material passing the No. 200 sieve). Other design considerations such as cold temperatures and condensation development could warrant more extensive design provisions.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

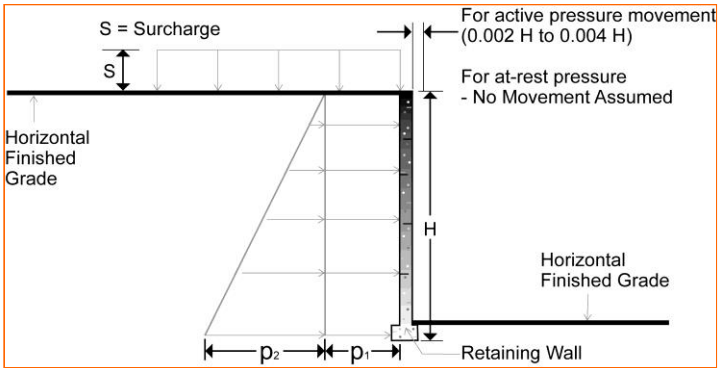
The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

LATERAL EARTH PRESSURES (POOL AREA)

Design Parameters

The sides of the planned in-ground pool will function as retaining walls, throughout the life of the structure but especially when the pool is drained. Structures with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to values indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown in the diagram below. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement and is commonly used for basement walls, loading dock walls, or other walls restrained at the top. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls (unless stated).

These design parameters should not be used in the design of mechanically stabilized modular block retaining walls (MSE walls). If such walls become part of the construction slope, Terracon can address their design and construction in an addendum to this report.



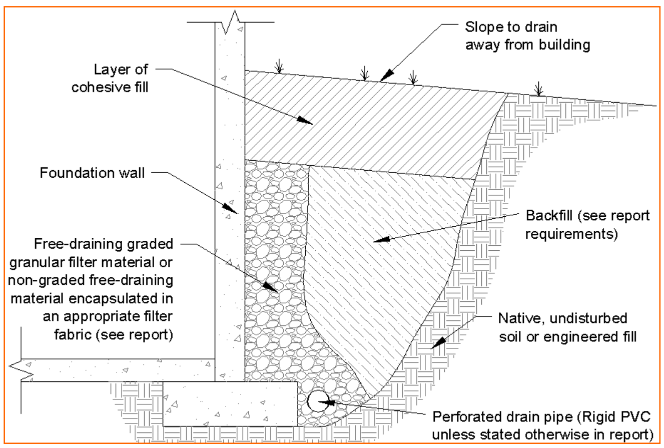
Lateral Earth Pressure Design Parameters			
Earth Pressure Condition [1]	**Coefficient for Backfill Type** [2]	**Surcharge Pressure** [3, 4, 5] **p_1 (psf)**	**Effective Fluid Pressures (psf)** [2, 4, 5]
Active (Ka)	On-site - 0.33	(0.33)S	(40)H
At-Rest (Ko)	On-site - 0.50	(0.50)S	(60)H
Passive (Kp)	On-site - 3.0	---	(345)H

1. For active earth pressure, wall must rotate about base, with top lateral movements 0.002 H to 0.004 H, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance.
2. Uniform, horizontal backfill, compacted to at least 95% of the ASTM D 698 maximum dry density, rendering a maximum unit weight of 115 pcf.
3. Uniform surcharge, where S is surcharge pressure.
4. Loading from heavy compaction equipment is not included.
5. No safety factor is included in these values.

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For the granular values to be valid, the granular backfill must extend out and up from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively.

Subsurface Drainage for Below-Grade Walls

A perforated rigid plastic drain line installed behind the base of walls and extends below adjacent grade is recommended to prevent hydrostatic loading on the walls. The invert of a drain line around a below-grade building area or exterior retaining wall should be placed near foundation bearing level. The drain line should be sloped to provide positive gravity drainage to daylight or to a sump pit and pump. The drain line should be surrounded by clean, free-draining granular material having less than 5% passing the No. 200 sieve, such as No. 57 aggregate. The free-draining aggregate should be encapsulated in a filter fabric. The granular fill should extend to within 2 feet of final grade, where it should be capped with compacted cohesive fill to reduce infiltration of surface water into the drain system.



As an alternative to free-draining granular fill, a pre-fabricated drainage structure may be used. A pre-fabricated drainage structure is a plastic drainage core or mesh which is covered with filter fabric to prevent soil intrusion, and is fastened to the wall prior to placing backfill.

PAVEMENTS

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in **Earthwork**.

Pavement Design Parameters

The following traffic information was estimated by Terracon:

- Autos/light trucks: up to 300 vehicles per day
- Trash trucks: 2 per week
- Package delivery trucks/vans: up to 5 per week
- 20-year design period

Based on our experience with similar soil conditions and the laboratory test data, we have used a CBR value of 5 for the design. Subgrade preparation in the pavement areas should be performed as outlined in **Earthwork**.

Pavement Section Thicknesses

The following table provides options for AC and PCC Sections:

Pavement Type	Material	Component Thickness (in)	
		Parking Spaces	Site Drives
Asphalt	HMA Surface Course	1-½	1-½
	Tack Coat	---	0.04 to 0.08 gal/sy
	HMA Intermediate Course	---	1-½
	Prime Coat (If required)	0.30 gal/sy	0.30 gal/sy
	Base Course	6	6

The above sections represent minimum thicknesses for the anticipated traffic and, as such, periodic maintenance should be anticipated. Pavements subjected to higher traffic volumes and heavy trucks require thicker pavement sections.

For areas subject to concentrated and repetitive loading conditions such as entrances, dumpster pad, and areas where heavy trucks frequently stop or turn, we recommend using a Portland cement concrete pavement with a thickness of at least 7 inches underlain by at least 4 inches of crushed stone. As a minimum, the concrete pavement area for dumpster pads should be large enough to support the container and tipping axle of the refuse truck.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section.

General Design Recommendations

Aggregate base course should be SCDOT Graded Aggregate Base (SCDOT Section 305). Asphaltic cement concrete should be an approved mix design selected from the current SCDOT Standard Type C (SCDOT Sections 402 and 403). Compaction levels of the asphalt and Macadam Base Course materials should conform to SCDOT requirements.

Portland cement concrete should conform to Section 501 of the SCDOT Standard Specifications and have a minimum flexural strength of 550 psi and compressive strength of 4,000 psi. The compressive and flexural strength of the pavement should be tested to verify its strength.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Site grading at a minimum 2 percent grade away from the pavements.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install below pavement drainage systems surrounding areas anticipated for frequent wetting.
- Sealing all landscaped areas in, or adjacent to pavements to reduce moisture migration to subgrade soils.
- Placing compacted backfill against the exterior side of curb and gutter.
- Placing curb, gutter and/or sidewalk directly on subgrade soils without the use of base course materials.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment.

Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the priority when implementing a pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

FIGURES

Contents:

GeoModel

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Thirteen (13) test borings were drilled between September 27 and 28, 2022. The borings were drilled to depths ranging from approximately 10 to 30 feet bgs at the approximate locations shown on **Exploration Plan**.

Boring Layout and Elevations: The borings were located in the field by using the proposed site plan superimposed on an aerial photograph of the site. The borings were located using a hand-held GPS unit (estimated horizontal accuracy of about ±10 feet). Approximate elevations were obtained by interpolation from the provided Drake Street – Topo – Updated, dated August 31, 2022.

Subsurface Exploration Procedures: We advanced the borings with truck- and track-mounted, rotary drill rigs using continuous flight hollow stem augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. All borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Shear Wave Velocity Testing

Terracon utilized the SeisOpt® ReMi™ method to develop the full depth shear wave velocity profile at the site for use in determining the seismic site class. This method employs non-linear optimization technology to derive one-dimensional S-wave velocities from refraction microtremor (ambient noise) recordings using a typical seismograph and standard, low frequency, refraction geophones. We utilized 12 receivers (geophones) set along a straight-line array with a 27±-foot receiver spacing for a total length of about 345 feet along Array 1 shown on **Exploration Plan**. Unfiltered, 30-second records were recorded using the background 'noise' created by the moving traffic and other ambient vibrations. The collected data, the response spectrum in the 5 to 40 Hz range, was processed using the computer software SeisOpt® ReMi™ by Optim, LLC with the results plotted as a conventional shear wave velocity vs. depth profile. The shear wave velocity profile obtained using the SeisOpt® ReMi™ data reduction method is shown in **Exploration Results**.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D1140-17 Standard Test Method for Amount of Material in Soils Finer than No. 200 (75-µm) Sieve
- ASTM D698 Method A Standard Test Method for Moisture-Density Relationship

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

SITE LOCATION AND EXPLORATION PLANS

Contents:

Note: All attachments are one page unless noted above.

SITE LOCATION

Drake Street Development ■ Columbia, SC

October 27, 2022 ■ Terracon Project No. 73225121

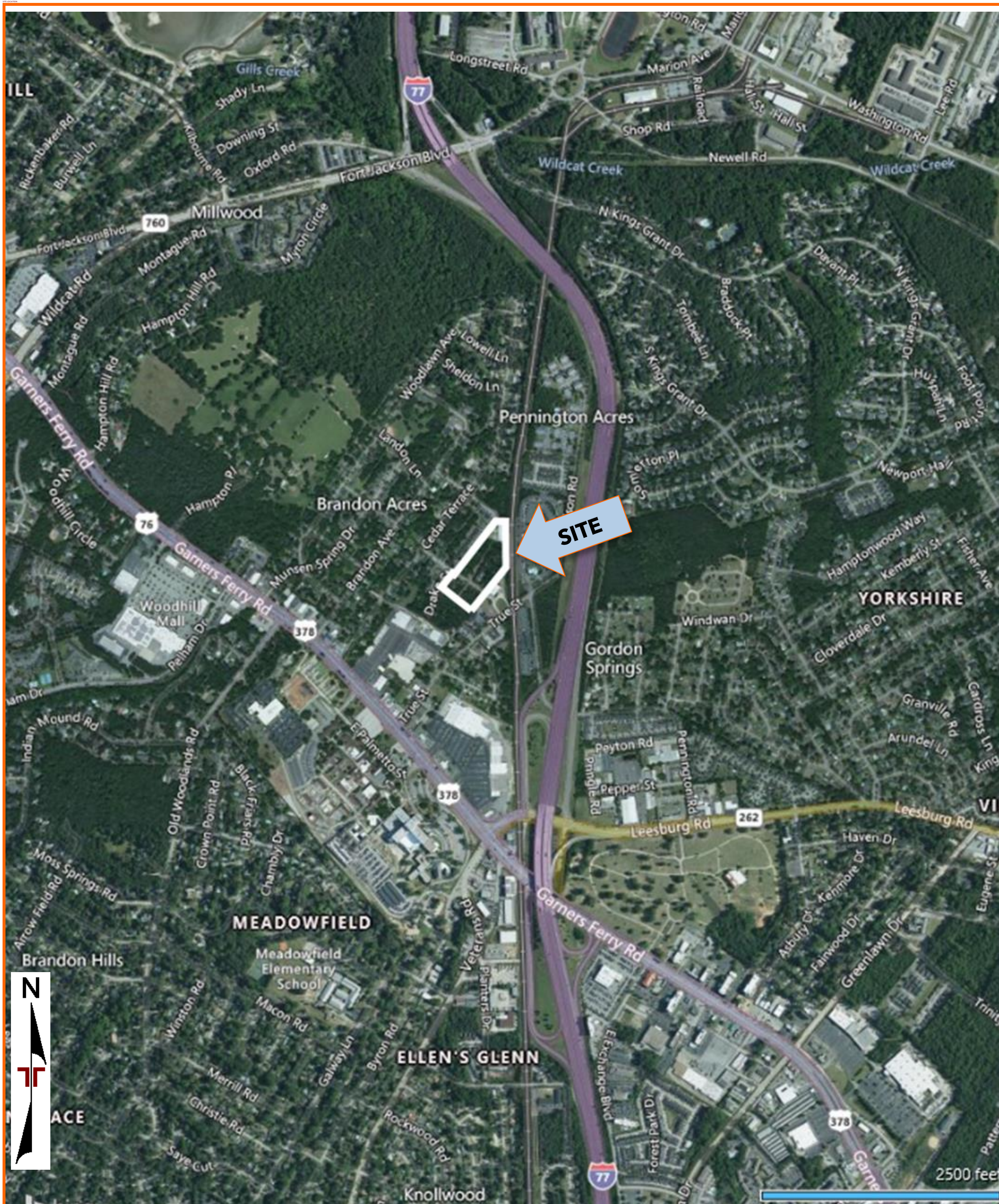


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Drake Street Development ■ Columbia, SC

October 27, 2022 ■ Terracon Project No. 73225121

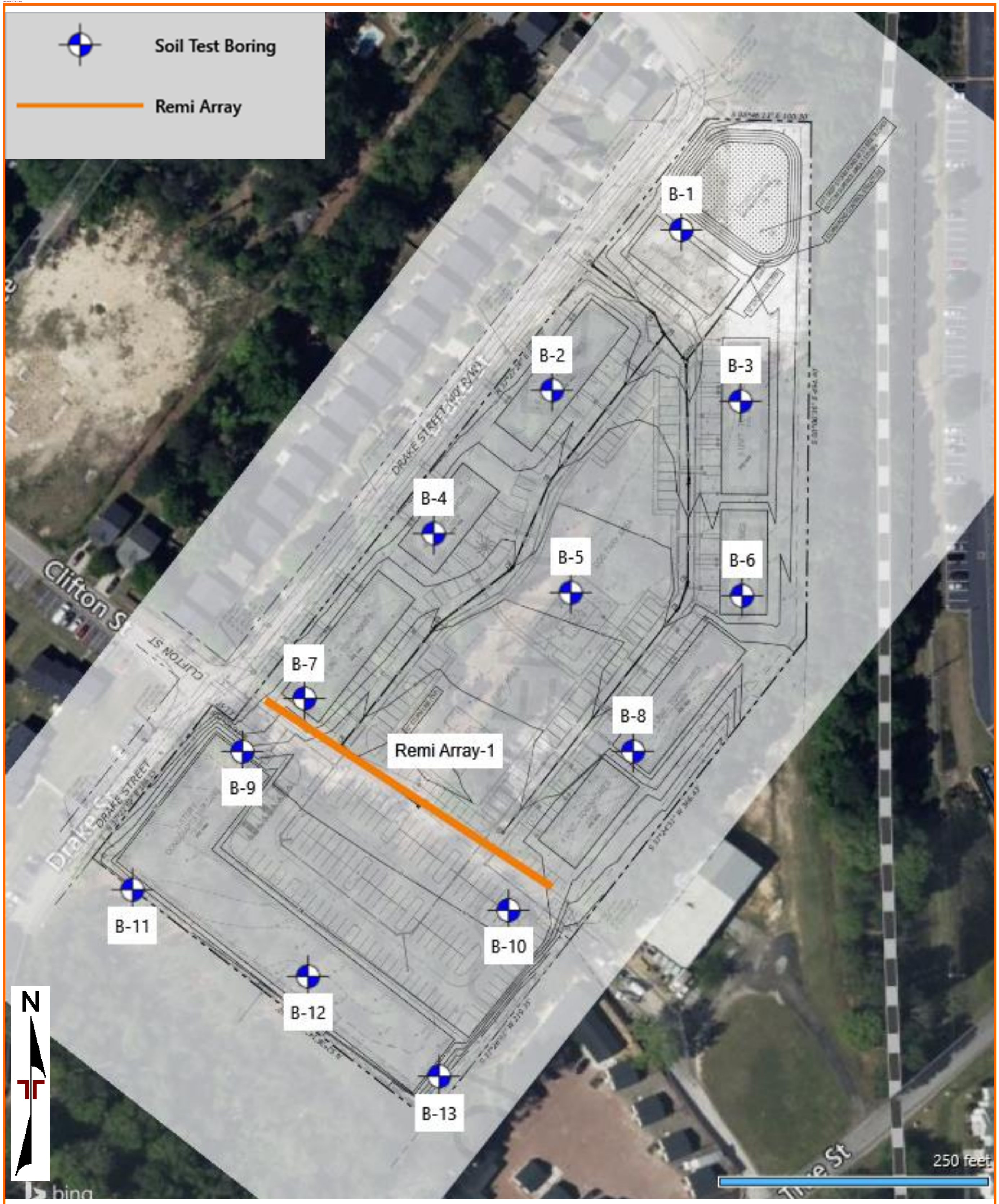


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9841° Longitude: -80.9567°

Approximate Surface Elev.: 141 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		0.2	**TOPSOIL**, (2 inches)	140.8+/-							
2			**SILTY SAND (SM)**, fine to medium grained, subangular, brown to light brown, moist, medium dense				X	3-5-8 N=13	10.1		
							X	2-4-7 N=11			
					5		X	4-6-8 N=14			
					10		X	5-5-6 N=11			
		15.0		126+/-	15		X	5-4-6 N=10			
			Boring Terminated at 15 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

No groundwater encountered at end of drilling

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-28-2022	Boring Completed: 09-28-2022
Drill Rig: 543	Driller: A. Bowen
Project No.: 73225121	

BORING LOG NO. B-2

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9837° Longitude: -80.9571°

Approximate Surface Elev.: 142 (Ft.) +/-

MODEL LAYER	DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	0.2	**TOPSOIL**, (2 inches)	141.8+/-
2	5.5	**SILTY SAND (SM)**, fine to medium grained, subangular, brown to light brown, dry, medium dense	136.5+/-
3	15.0	**CLAYEY SAND (SC)**, fine to medium grained, subangular, tan to white, moist, medium dense	127+/-
		Boring Terminated at 15 Feet	

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1-2.5		X	5-5-6 N=11			
3.5-5		X	4-4-7 N=11	5.1		
6-7.5		X	4-9-10 N=19			
8.5-10		X	4-6-8 N=14			
13.5-15		X	5-5-6 N=11			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

No groundwater encountered at end of drilling

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-28-2022	Boring Completed: 09-28-2022
Drill Rig: 543	Driller: A. Bowen
Project No.: 73225121	

BORING LOG NO. B-3

PROJECT: Drake Street Development

**CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT**

**SITE: Drake Street
Columbia, SC**

LOCATION See Exploration Plan

Latitude: 33.9837° Longitude: -80.9565°

Approximate Surface Elev.: 143 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	Description	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		0.2	**TOPSOIL**, (2 inches)	142.8+/-							
2			**SILTY SAND (SM)**, fine grained, subangular, brown, dry, loose to medium dense				X	3-4-5 N=9			
							X	8-11-9 N=20			
		5.5		137.5+/-	5						
3			**CLAYEY SAND (SC)**, fine to medium grained, subangular, reddish brown to white, moist, medium dense				X	5-9-12 N=21			
		8.0		135+/-							
2			**SILTY SAND (SM)**, fine to medium grained, subangular, reddish brown, moist, medium dense				X	8-9-6 N=15			
					10						
							X	7-9-11 N=20			
		15.0		128+/-	15						

Boring Terminated at 15 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

No groundwater encountered at end of drilling

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-28-2022	Boring Completed: 09-28-2022
Drill Rig: 543	Driller: A. Bowen
Project No.: 73225121	

BORING LOG NO. B-4

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9833° Longitude: -80.9575°

Approximate Surface Elev.: 142 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH / DESCRIPTION / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		0.2 **TOPSOIL**, (2 inches) — 141.8+/-							
2		**SILTY SAND (SM)**, fine to medium grained, subangular, brown to white, dry to moist, medium dense to dense			X	6-8-8 N=16	3.8		
			5		X	15-14-17 N=31			
					X	7-15-13 N=28			
			10		X	5-6-4 N=10			
		15.0 — 127+/-	15		X	5-5-8 N=13			

Boring Terminated at 15 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-28-2022	Boring Completed: 09-28-2022
Drill Rig: 543	Driller: A. Bowen
Project No.: 73225121	

BORING LOG NO. B-5

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9832° Longitude: -80.9571°

Approximate Surface Elev.: 144 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		0.2	**TOPSOIL**, (2 inches)	143.8+/-							
2			**SILTY SAND (SM)**, fine to medium grained, subangular, brown to yellowish brown, dry to moist, loose to medium dense				X	2-2-3 N=5			
					5		X	5-7-7 N=14			
							X	9-6-8 N=14			
		10.0		134+/-	10		X	7-9-11 N=20	15.5		29
			Boring Terminated at 10 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

No groundwater encountered at end of drilling

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-28-2022	Boring Completed: 09-28-2022
Drill Rig: 543	Driller: A. Bowen
Project No.: 73225121	

BORING LOG NO. B-6

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9832° Longitude: -80.9565°

Approximate Surface Elev.: 145 (Ft.) +/-

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1	0.1	**TOPSOIL**, (1 inch)	144.9+/-							
1		**FILL - SILTY SAND (SM)**, with gravel and organics, subangular, brown to olive brown, dry to moist, medium dense				X	4-7-5 N=12	9.0		
1						X	4-4-6 N=10			
1	5.5		139.5+/-	5						
3		**CLAYEY SAND (SC)**, fine to medium grained, subangular, reddish brown to white, moist, medium dense				X	4-7-10 N=17			
3						X	4-5-8 N=13			
3	12.0		133+/-	10						
4		**LEAN CLAY (CL)**, white, moist, very stiff				X	7-11-15 N=26			
4	15.0		130+/-	15						
		Boring Terminated at 15 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

No groundwater encountered at end of drilling

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-27-2022	Boring Completed: 09-27-2022
Drill Rig: DR437	Driller: S. Truesdale
Project No.: 73225121	

BORING LOG NO. B-7

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9829° Longitude: -80.9579°

Approximate Surface Elev.: 144 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		0.2	**TOPSOIL**, (2 inches)	143.8+/-							
2			**SILTY SAND (SM)**, fine grained, subangular, brown to reddish brown, dry to moist, medium dense to loose					9-8-6 N=14	4.0		
								3-4-5 N=9			
		5.5		138.5+/-	5						
3			**CLAYEY SAND (SC)**, fine grained, subangular, yellowish brown to gray, moist, medium dense					9-11-12 N=23			
								4-7-10 N=17			
		12.0		132+/-	10						
2			**SILTY SAND (SM)**, fine grained, moist, yellowish brown, moist, medium dense					4-4-11 N=15			
		15.0		129+/-	15						

Boring Terminated at 15 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

No groundwater encountered at end of drilling

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-27-2022	Boring Completed: 09-27-2022
Drill Rig: DR437	Driller: S. Truesdale
Project No.: 73225121	

BORING LOG NO. B-8

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9828° Longitude: -80.9569°

Approximate Surface Elev.: 146 (Ft.) +/-

Model Layer	Depth	Description	Elevation (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.1	**TOPSOIL**, (1 inch)	145.9+/-							
1	3.0	**FILL - SILTY SAND (SM)**, with gravel, fine grained, subangular, light brown, dry, medium dense	143+/-			X	11-10-9 N=19			
4	8.0	**SANDY LEAN CLAY (CL)**, reddish brown to yellowish brown, moist, very stiff	138+/-	5		X	6-8-12 N=20	20.3	47-22-25	50
						X	10-7-9 N=16			
2	15.0	**SILTY SAND (SM)**, fine to coarse grained, subangular, yellowish brown, moist, medium dense	131+/-	10		X	7-9-9 N=18			
				15		X	7-5-5 N=10			

Boring Terminated at 15 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

No groundwater encountered at end of drilling

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-27-2022	Boring Completed: 09-27-2022
Drill Rig: DR437	Driller: S. Truesdale
Project No.: 73225121	

BORING LOG NO. B-9

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9828° Longitude: -80.9581°

Approximate Surface Elev.: 144 (Ft.) +/-

MODEL LAYER	DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1	0.2	**TOPSOIL**, (2 inches)	143.8+/-							
		FILL - POORLY GRADED SAND WITH SILT (SP-SM), with gravel, fine grained, subangular, brown to yellowish brown, dry, medium dense to loose				X	4-6-5 N=11			
	5.5		138.5+/-	5		X	3-3-3 N=6	3.1		
3		**CLAYEY SAND (SC)**, coarse to medium grained, subangular, yellowish brown, moist, medium dense				X	8-12-13 N=25	11.0	46-21-25	23
				10		X	8-8-9 N=17			
	12.0		132+/-							
4		**LEAN CLAY (CL)**, light gray, moist, very stiff				X	11-13-15 N=28			
	15.0		129+/-	15						
		Boring Terminated at 15 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

No groundwater encountered at end of drilling

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-27-2022	Boring Completed: 09-27-2022
Drill Rig: DR437	Driller: S. Truesdale
Project No.: 73225121	

BORING LOG NO. B-10

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9824° Longitude: -80.9573°

Approximate Surface Elev.: 147 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0.1 **TOPSOIL**, (1 inch)	146.9+/-							
		FILL - SILTY SAND (SM), with gravel, fine grained, subangular, light brown, dry, medium dense				X	8-8-7 N=15			
						X	5-7-10 N=17			
		5.5	141.5+/-	5						
2		**SILTY SAND (SM)**, fine grained, subangular, yellowish brown, moist, loose to medium dense				X	3-3-5 N=8			
						X	4-4-6 N=10			
				10						
						X	5-6-7 N=13			
		15.0	132+/-	15						
		Boring Terminated at 15 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

No groundwater encountered at end of drilling

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-27-2022	Boring Completed: 09-27-2022
Drill Rig: DR437	Driller: S. Truesdale
Project No.: 73225121	

BORING LOG NO. B-11

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9824° Longitude: -80.9584°

Approximate Surface Elev.: 147 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH / DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
2		**SILTY SAND (SM)**, fine grained, subangular, brown, dry, medium dense				X	4-6-5 N=11	11.4		
		3.0	144+/-							
		SILTY SAND (SM), fine to coarse grained, subangular, reddish brown to white, moist, medium dense				X	6-7-10 N=17			
				5		X	9-6-11 N=17			
						X	7-9-13 N=22			
				10						
						X	9-11-15 N=26			
		15.0	132+/-	15						
		Boring Terminated at 15 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-28-2022	Boring Completed: 09-28-2022
Drill Rig: 543	Driller: A. Bowen
Project No.: 73225121	

BORING LOG NO. B-12

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9822° Longitude: -80.9579°

Approximate Surface Elev.: 149 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		0.2	**TOPSOIL**, (2 inches)	148.8+/-							
3			**CLAYEY SAND (SC)**, fine grained, subangular, brown to yellowish brown, dry, loose to medium dense				X	5-5-4 N=9	12.6		
							X	4-8-11 N=19			
		5.5		143.5+/-	5						
2			**SILTY SAND (SM)**, fine grained, subangular, yellowish brown to white, moist, medium dense				X	10-11-11 N=22			
							X	13-8-9 N=17			
					10						
							X	9-8-7 N=15			
					15						
							X	9-6-6 N=12			
					20						
							X	10-14-14 N=28			
					25						
							X	1-6-8 N=14			
		30.0		119+/-	30	▽					
			Boring Terminated at 30 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

▽ *30' (At end of drilling)*

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-27-2022	Boring Completed: 09-27-2022
Drill Rig: DR437	Driller: S. Truesdale
Project No.: 73225121	

BORING LOG NO. B-13

PROJECT: Drake Street Development

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

SITE: Drake Street
Columbia, SC

LOCATION See Exploration Plan

Latitude: 33.9819° Longitude: -80.9575°

Approximate Surface Elev.: 150 (Ft.) +/-

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	0.2	**TOPSOIL**, (2 inches)	149.8+/-							
2		**SILTY SAND (SM)**, fine grained, subangular, brown, moist, loose to medium dense				X	4-4-5 N=9	12.1		
						X	5-7-9 N=16			
	5.5		144.5+/-	5						
		SILTY SAND (SM), fine to coarse grained, subangular, light brown to white, moist, loose to medium dense				X	7-10-7 N=17			
	8.0		142+/-							
3		**CLAYEY SAND (SC)**, fine to medium grained, subangular, brown to black, moist, medium dense				X	7-12-13 N=25			
				10						
						X	7-10-13 N=23			
	15.0		135+/-	15						
		Boring Terminated at 15 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

Elevations were interpolated from "Drake St. - Topo - Updated" dated 8/31/2022

WATER LEVEL OBSERVATIONS

Terracon
521 Clemson Rd
Columbia, SC

Boring Started: 09-28-2022	Boring Completed: 09-28-2022
Drill Rig: 543	Driller: A. Bowen
Project No.: 73225121	

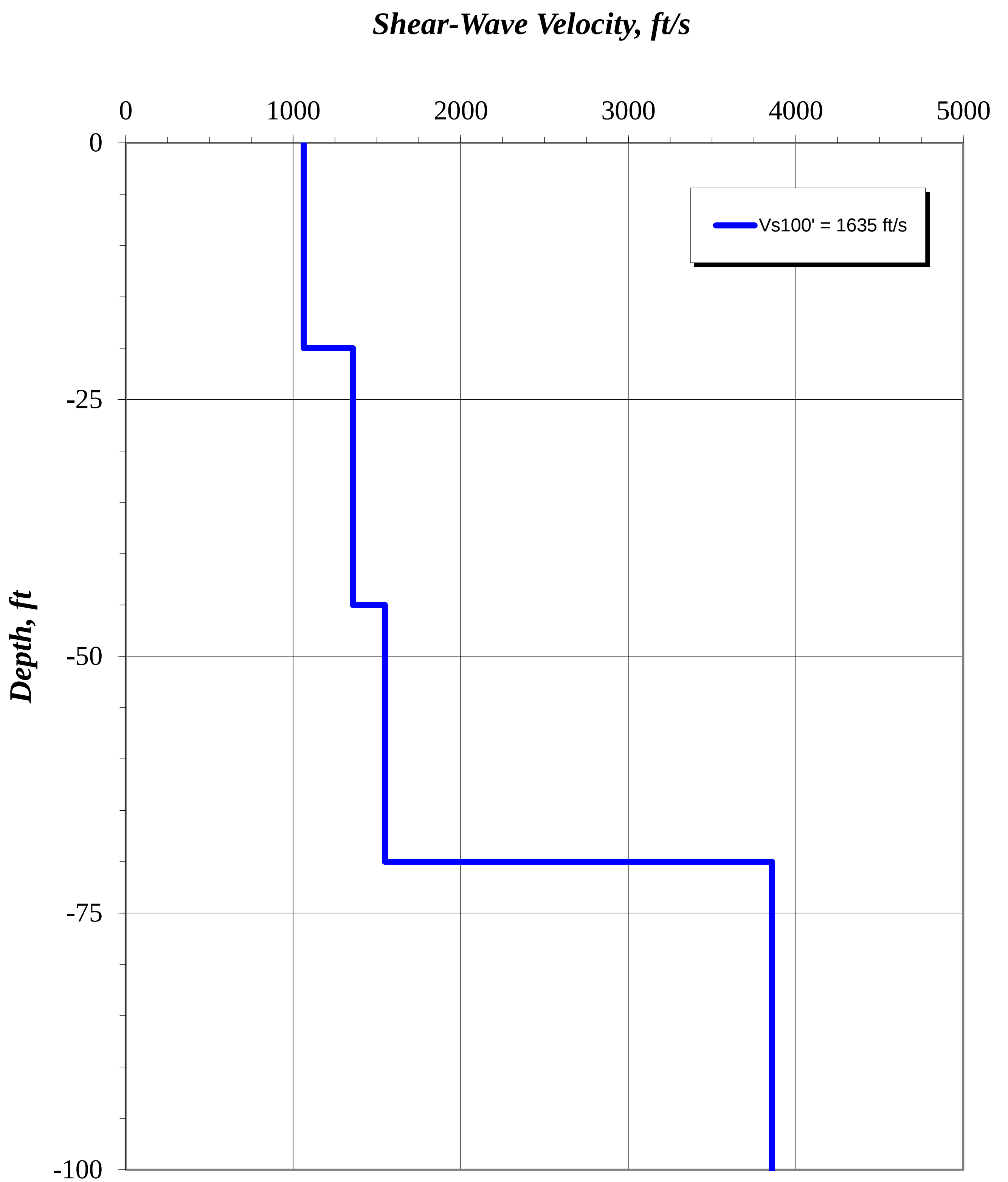


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS
NOT INTENDED FOR CONSTRUCTION PURPOSES

Summary of Laboratory Results

BORING ID	Depth (Ft.)	Liquid Limit	Plastic Limit	Plasticity Index	% Fines	Water Content (%)
B-5 Bulk	0-5				15.4	6.0
B-1	1-2.5					10.1
B-2	3.5-5					5.1
B-4	1-2.5					3.8
B-5	8.5-10				29.1	15.5
B-6	1-2.5					9.0
B-7	1-2.5					4.0
B-8	3.5-5	47	22	25	50.1	20.3
B-9	3.5-5					3.1
B-9	6-7.5	46	21	25	23.5	11.0
B-11	1-2.5					11.4
B-12	1-2.5					12.6
B-13	1-2.5					12.1

PROJECT: Drake Street Development

SITE: Drake Street
Columbia, SC

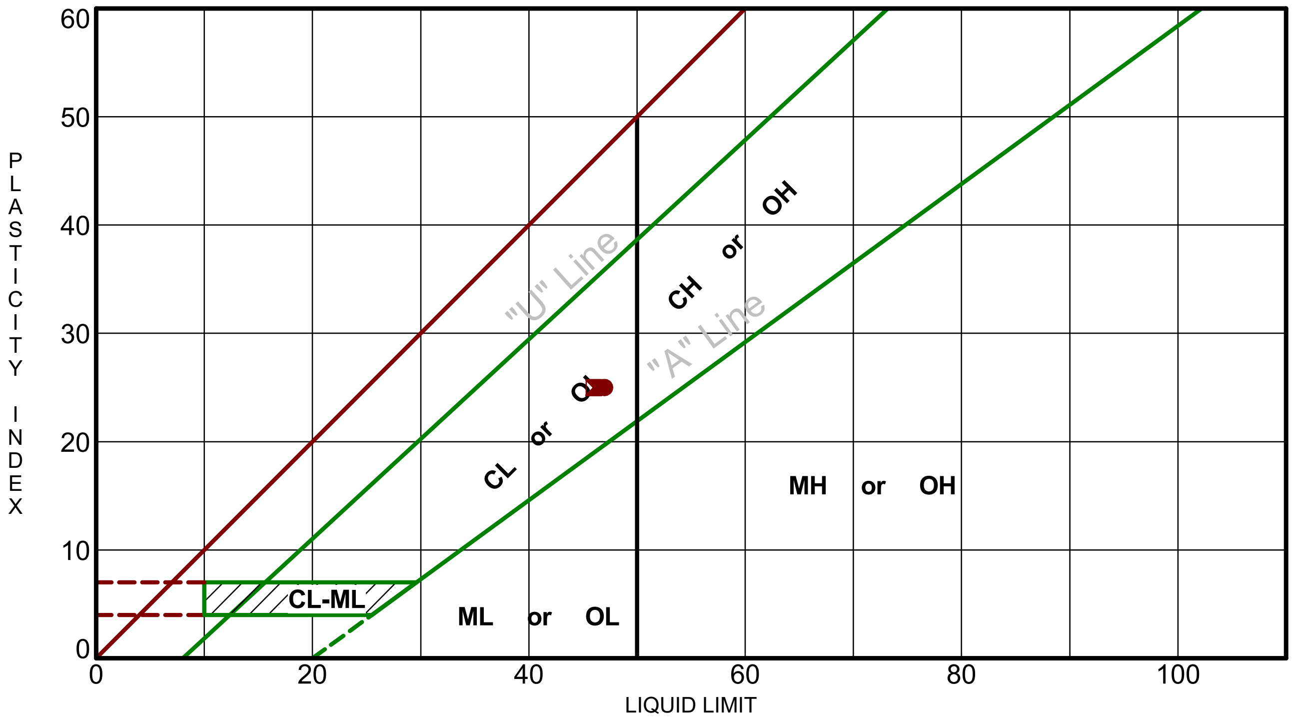
Terracon
521 Clemson Rd
Columbia, SC

PROJECT NUMBER: 73225121

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

ATTERBERG LIMITS RESULTS

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-8	3.5 - 5	47	22	25	50.1	CL	SANDY LEAN CLAY
⊠	B-9	6 - 7.5	46	21	25	23.5	SC	CLAYEY SAND

PROJECT: Drake Street Development

SITE: Drake Street
Columbia, SC

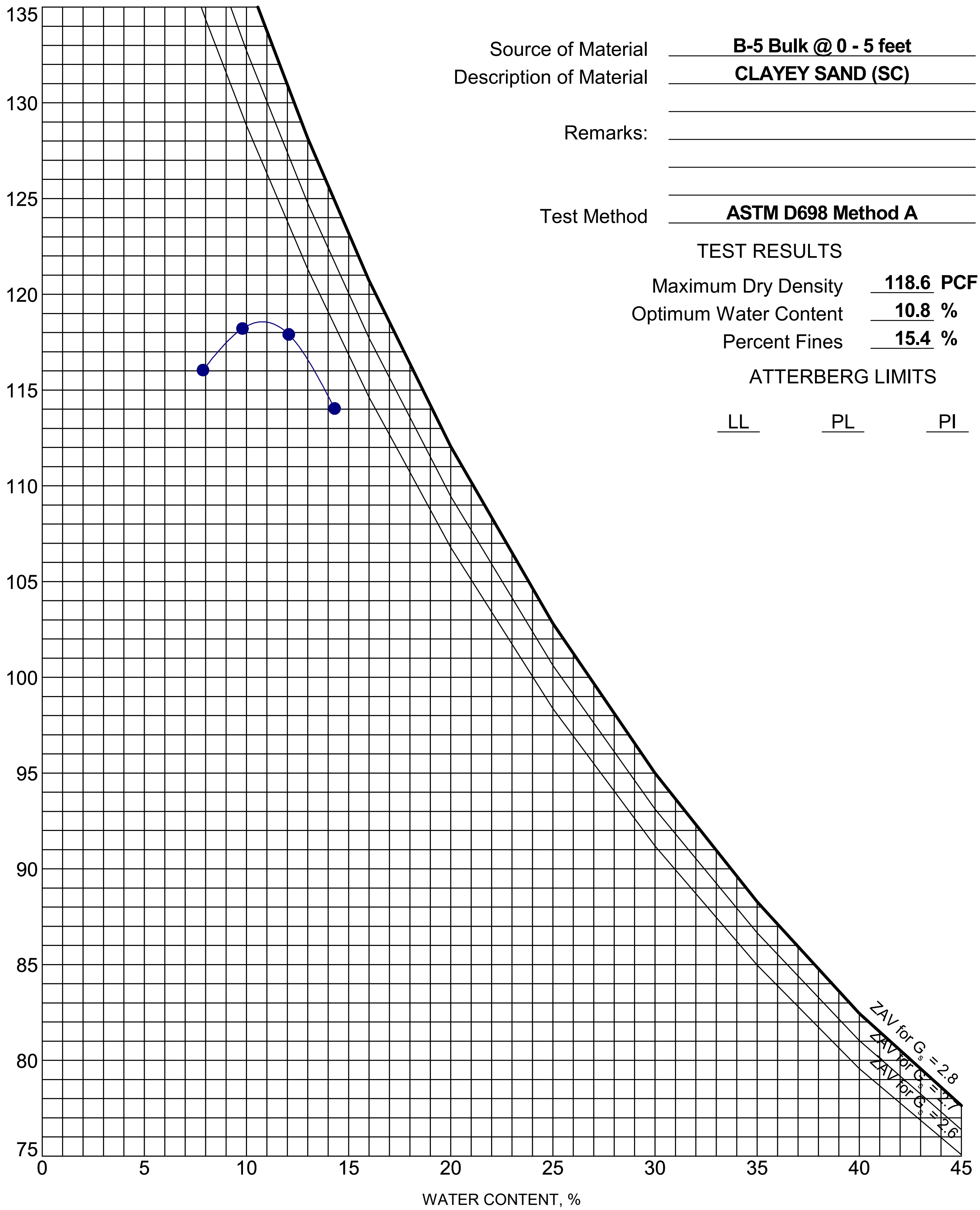
Terracon
521 Clemson Rd
Columbia, SC

PROJECT NUMBER: 73225121

CLIENT: Terra Alta Ventures LLC
Salt Lake City, UT

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material **B-5 Bulk @ 0 - 5 feet**

Description of Material **CLAYEY SAND (SC)**

Remarks:

Test Method **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density **118.6 PCF**

Optimum Water Content **10.8 %**

Percent Fines **15.4 %**

ATTERBERG LIMITS

LL	PL	PI

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 73225121 DRAKE STREET DEVE.GPJ TERRACON_DATATEMPLATE.GDT 10/5/22

PROJECT: Drake Street Development	Terracon 521 Clemson Rd Columbia, SC	PROJECT NUMBER: 73225121
SITE: Drake Street Columbia, SC		CLIENT: Terra Alta Ventures LLC Salt Lake City, UT

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING	WATER LEVEL	FIELD TESTS
Grab Sample Split Spoon	▽ Water Initially Encountered Water Level After a Specified Period of Time ▼ Water Level After a Specified Period of Time Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL		RELATIVE PROPORTIONS OF FINES	
Descriptive Term(s) of other constituents	Percent of Dry Weight	**Descriptive Term(s) of other constituents**	**Percent of Dry Weight**
Trace	<15	Trace	<5
With	15-29	With	5-12
Modifier	>30	Modifier	>12

GRAIN SIZE TERMINOLOGY		PLASTICITY DESCRIPTION	
Major Component of Sample	**Particle Size**	**Term**	**Plasticity Index**
Boulders	Over 12 in. (300 mm)	Non-plastic	0
Cobbles	12 in. to 3 in. (300mm to 75mm)	Low	1 - 10
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)	Medium	11 - 30
Sand	#4 to #200 sieve (4.75mm to 0.075mm	High	> 30
Silt or Clay	Passing #200 sieve (0.075mm)		

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification: Group Symbol	Soil Classification: Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3 [E]	GW	Well-graded gravel [F]
			Cu < 4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3 [E]	SW	Well-graded sand [I]
			Cu < 6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10} \qquad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.